Application Note : RAN201002R3

How To Test Data Channel Using RWC2010C

SLS / EPG / SPI / DLS

June 2025

Introduction

The RWC2010C provides a powerful multiplexing environment for transmitting and verifying supplementary data services essential to digital radio (DAB/DAB+), including SLS, EPG, SPI, and DLS. Depending on your specific test purposes and available content sources, you can configure the Component Mode into either an audio channel or a packet data channel using the following three methods:

- **Packet Data Channel Mode**: By selecting an independent data mode such as SLS or SPI for the Component Mode, you can establish and test a pure packet data transmission environment based on a Secondary Component.
- **PAD (Program Associated Data) Channel Mode**: When the primary audio component mode is set to DAB, you can test real-time data transmission by combining DLS, DL+, SLS, or SPI data directly into the audio stream through the sub-level PAD_TYPE configuration. (Note: When DAB+ mode is selected, the RWC2010C's internal, manual PAD configuration feature is not provided.)
- **Pre-coded Data Contents Mode**: When configuring the Component Mode as an audio channel (DAB or DAB+), you can load an external audio stream file (.mp2 or a DAB+ supported file) that already has DLS(, DL+), or SLS data pre-mapped (embedded) into its internal PAD area to perform comprehensive data receiver testing.

1. SLS - Slideshow

The RWC2010C provides a function to test SLS using the PAD or Packet Data channel. You can download your own picture files into the RWC2010C. Picture files for SLS testing must be in PNG format and the file size must be small enough. Some PNG files can be downloaded from RedwoodComm's file server using a PC program as described in section 1.3.

1.1 SLS Test Using Data Channel

The SLS packet data channel can be configured as a secondary component of the existing DAB service as below.

SERVICE_00

PRIMARY	COMPONENT_00
SECONDARY_1	COMPONENT_01

COMPONENT_00

MODE	DAB
— CONTENTS	any mp2 file

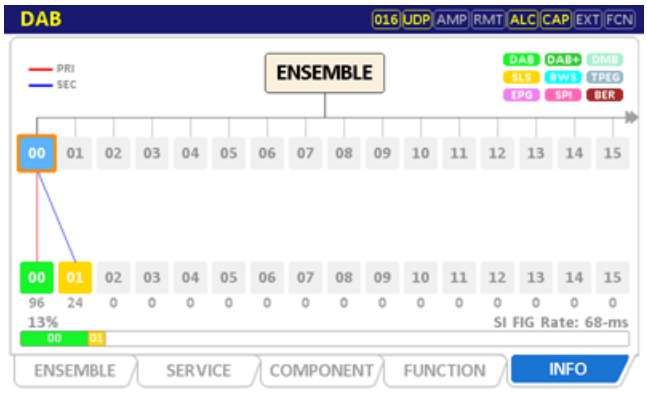
COMPONENT_01

MODE	SLS
— CONTENTS	peyto_lake.png (208 x 104)

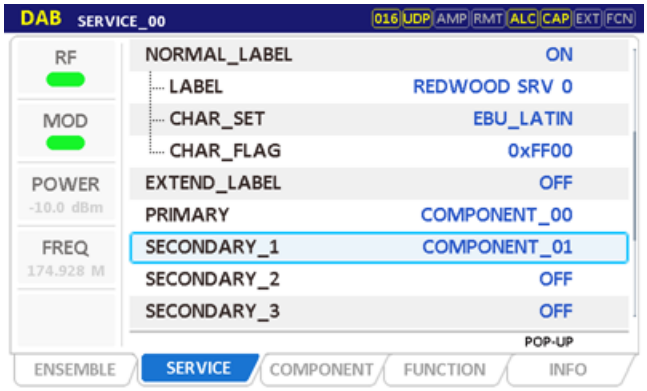


rwc_logo_240x160.png
rwc_logo_320x240.png
rwc_logo_480x320.png

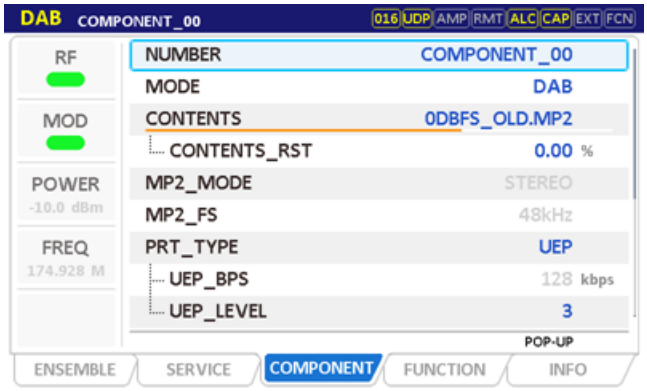




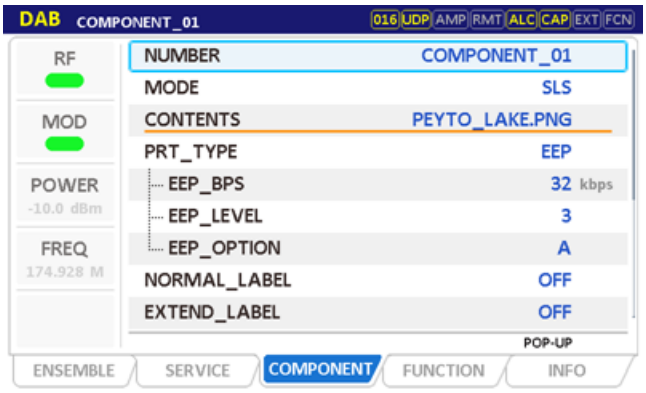
[Ensemble Structure]



[Service 00]



[Component 00 - DAB]



[Component 01 - SLS]

1.2 SLS Test Using PAD

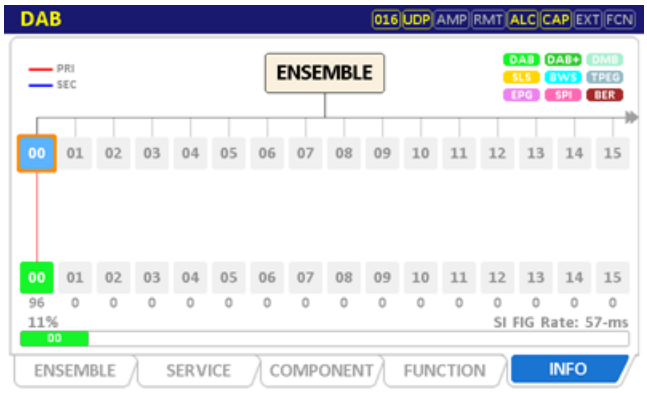
The SLS using the PAD channel can be configured in the primary component as below.

SERVICE_00

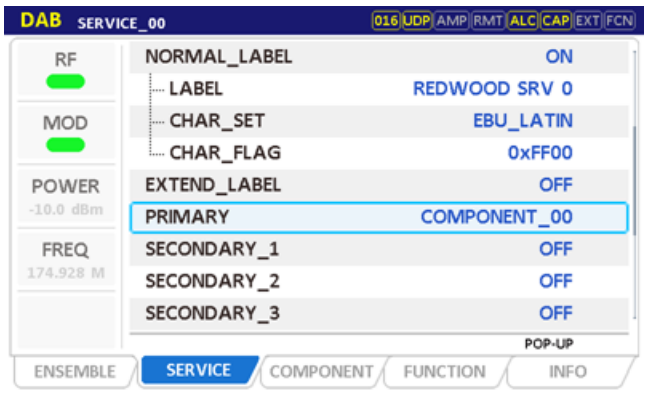
PRIMARY	COMPONENT_00

COMPONENT_00

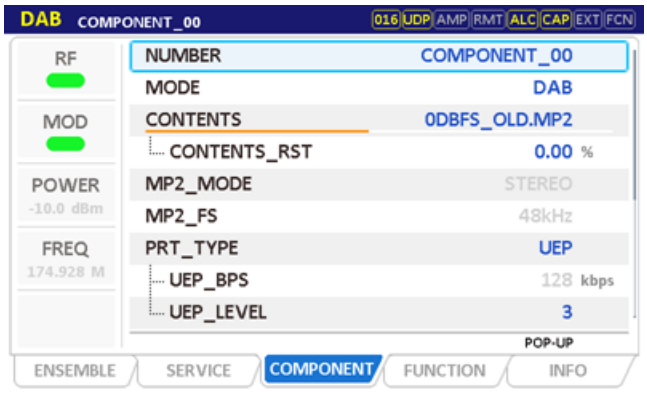
MODE	DAB
— CONTENTS	any mp2 file
PAD_TYPE	SLS
— CONTENTS	peyto_lake.png (208 x 104) rwc_logo_240x160.png rwc_logo_320x240.png rwc_logo_480x320.png



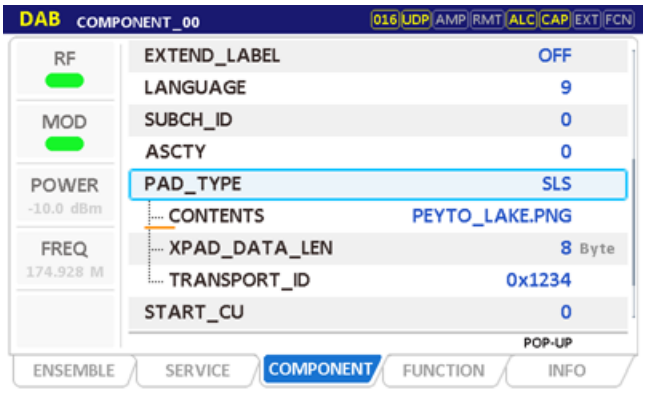
[Ensemble Structure]



[Service 00]



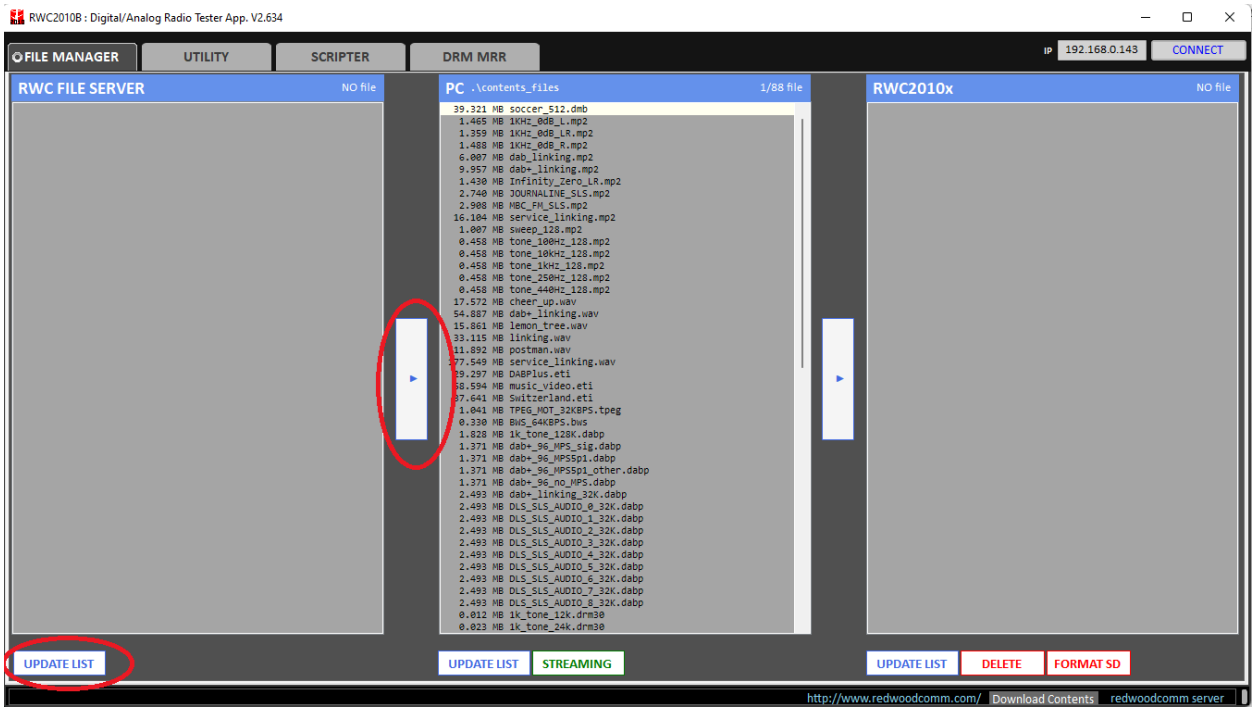
[Component 00 - DAB]



[Component 00 PAD - SLS]

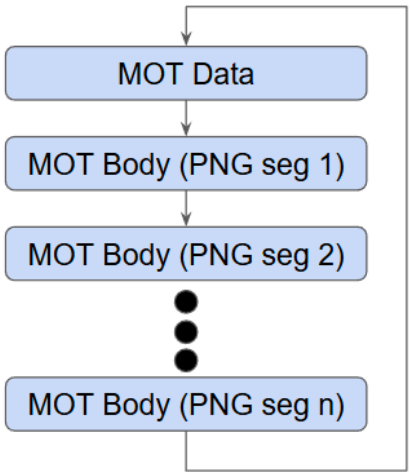
1.3 Example of PNG file download using a PC program

To get example PNG files, run the RWC2010_utility.exe program and select the FILE MANAGER. Then, click the update list icon to get the file list from RedwoodComm's file server in the lower-left corner. Select the files you want to download and click the download icon (arrow button between RWC FILE SERVER and PC).



1.4 Example of MOT data

It shows the structure and example values of the MOT Data and MOT Body transmitted through the SLS Data Service channel. MOT Body is used to transmit PNG files.



1.4.1 MOT Data

group	parameter	value (dec)	Description
DG Header	Extension flag	0	no extension
	CRC flag	1	data group CRC present
	Segment flag	1	
	User access flag	1	
	DG_type	3	MOT header
Session Header	Last	1	
	Segment number	0	
	Transport Id flag	1	
	Length indicator	2	
	Transport Id	GUI	
Segment Header	Repetition Count	0	
	SegmentSize	34	

Header core	BodySize	var	PNG file size
	HeaderSize	var	
	ContentType	2	image
	ContentSubType	3	PNG
Header extension	PLI	3	Parameter 0
	ParamId	12	ContentName
	DataField	edwoodcomm_sls.pn	
	PLI	2	Parameter 1
	ParamId	5	TriggerTime
	DataField	0	Show immediately
CRC	CRC	var	

1.4.1 MOT Body

group	parameter	value (dec)	Description
DG Header	Extension flag	0	no extension
	CRC flag	1	data group CRC present
	Segment flag	1	
	User access flag	1	
	DG_type	4	MOT body
Session Header	Last	var	
	Segment number	var	
	Transport Id flag	1	
	Length indicator	2	
	Transport Id	GUI	
Segment Header	Repetition Count	0	
	SegmentSize	var	
PNG file or SI	Segment of PNG file or SI		
CRC	CRC	var	

2. EPG - Electronic Program Guide

The RWC2010C provides the function to test EPG using the PAD or Packet Data channel. The start time and duration of the program can be edited in the RWC2010C GUI. You can edit up to 10 program schedules.

2.1 EPG Test Using Data Channel

The EPG packet data channel can be configured as a secondary component of the existing DAB service as below.

SERVICE_00

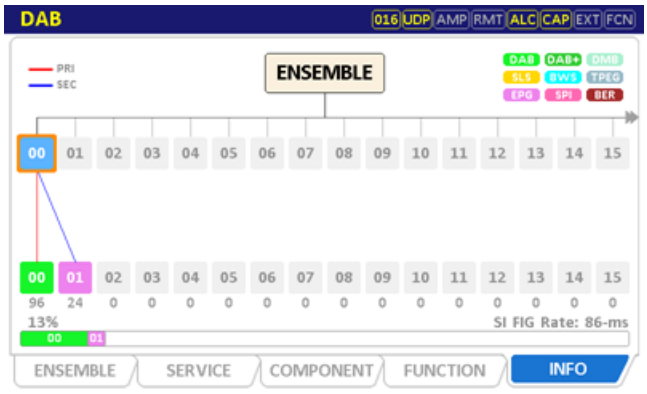
PRIMARY	COMPONENT_00
SECONDARY_1	COMPONENT_01

COMPONENT_00

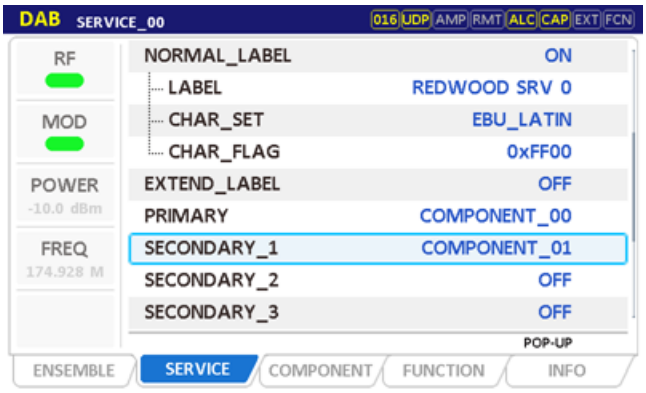
MODE	DAB
— CONTENTS	any mp2 file

COMPONENT_01

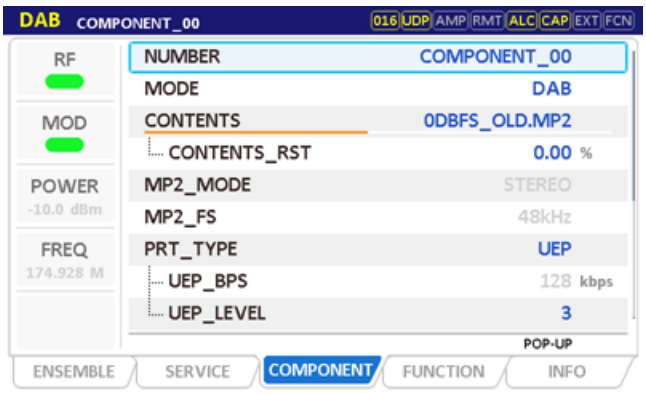
MODE	EPG
— CONTENTS	(none; internally allocated)
EEP_BPS	32 KBPS



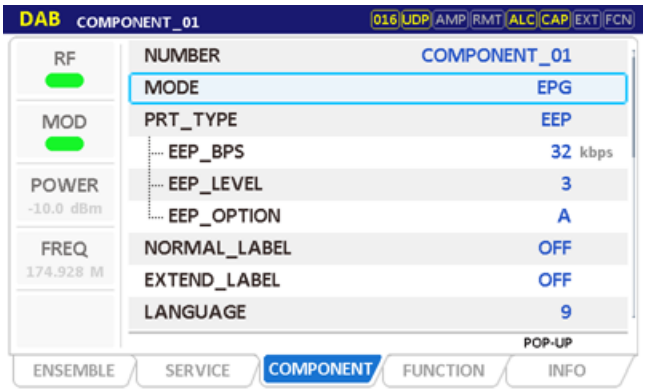
[Ensemble Structure]



[Service 00]



[Component 00 - DAB]



[Component 01 - EPG]

2.2 EPG Test Using PAD

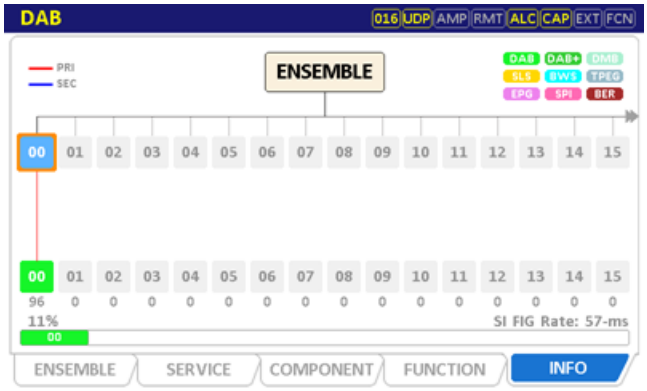
The EPG using the PAD channel can be configured in the primary component as below.

SERVICE_00

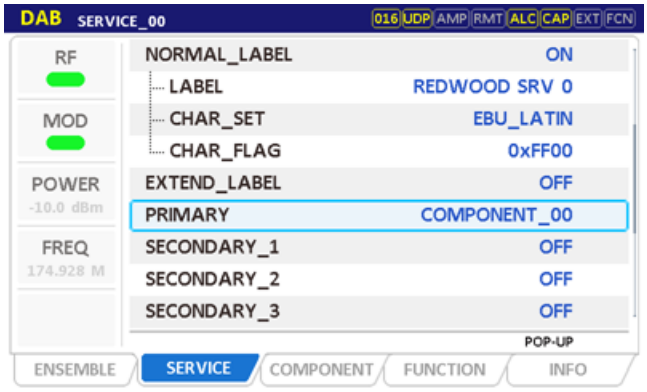
PRIMARY COMPONENT_00

COMPONENT_00

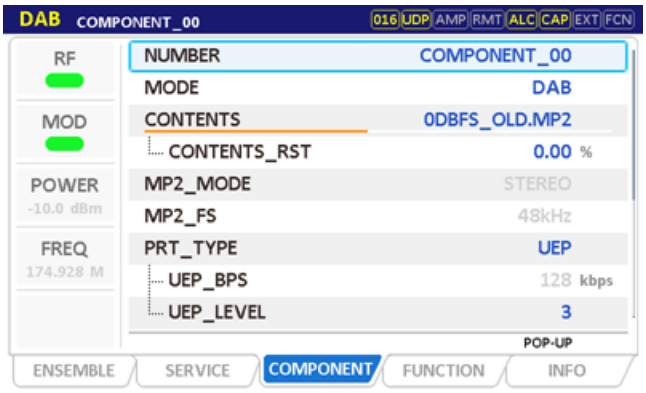
MODE DAB
— CONTENTS any mp2 file
PAD_TYPE EPG
— CONTENTS (none; internally allocated)



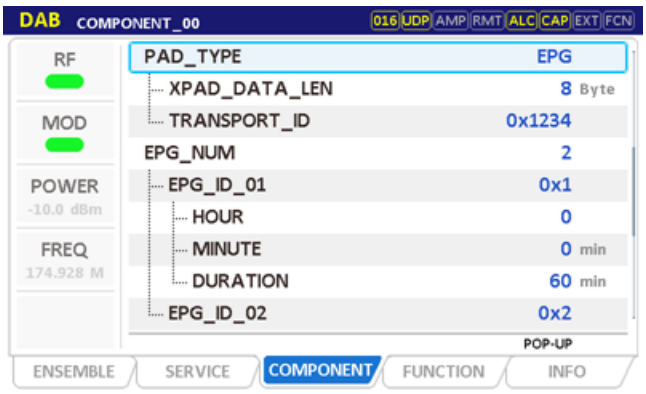
[Ensemble Structure]



[Service 00]



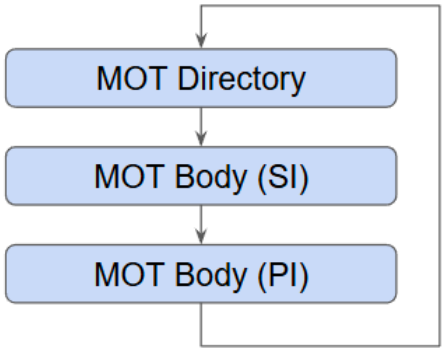
[Component 00 - DAB]



[Component 00 PAD - EPG]

2.3 Example of EPG MOT Data

It shows the structure and example values of the MOT Directory, MOT Body and SI objects transmitted through the EPG Data Service channel. MOT Body is used to transmit SI and PI objects.



2.3.1 MOT Directory

group	parameter	value (dec)	Description
DG Header	Extension flag	0	no extension
	CRC flag	1	data group CRC present
	Segment flag	1	
	User access flag	1	
	DG_type	6	MOT directory
Session Header	Last	1	
	Segment number	0	
	Transport Id flag	1	
	Length indicator	2	
	Transport Id	GUI	
Segment Header	Repetition Count	0	
	SegmentSize	var	
MOT Directory	CompressionFlag	0	
	Directory size	var	
	Number of Objects	2	
	Carousel_period	0	
	SegmentSize	0	
	Directory Extension Length	3	
	PLI	0	Parameter 0

	ParamId	0	SortedHeaderInformation
Object 1 (SI)	Transport Id	GUI + 1	
	Obj_BodySize	var	
	HeaderSize	33	
	ContentType	7	SPI system
	ContentSubType	0	Service Information
	PLI	3	Parameter 0
	ParamId	12	ContentName
	DataField	epg_si_redwood.xml	
	PLI	3	Parameter 1
	ParamId	39	SPI ScopeID
	DataField	ECC+EID	
Object 2 (PI)	Transport Id	GUI + 2	
	Obj_BodySize	var	
	HeaderSize	40	
	ContentType	7	SPI system
	ContentSubType	1	Programme Information
	PLI	3	Parameter 0
	ParamId	12	ContentName
	DataField	pg_pi00_redwood.xm	
	PLI	2	Parameter 1
	ParamId	37	SPI ScopeStart
	DataField	var	
	PLI	2	Parameter 1
	ParamId	38	SPI ScopeEnd
	DataField	var	
	PLI	3	Parameter 1
	ParamId	39	SPI ScopeID
	DataField	ECC+EID+SID	
CRC	CRC		

2.3.2 MOT Body

group	parameter	value	Description
DG Header	Extension flag	0	no extension
	CRC flag	1	data group CRC present
	Segment flag	1	
	User access flag	1	
	DG_type	4	MOT body
Session Header	Last	var	
	Segment number	var	
	Transport Id flag	1	
	Length indicator	2	
	Transport Id	GUI	
Segment Header	Repetition Count	0	
	SegmentSize	var	
PNG file or SI	Segment of PNG file or SI		
CRC	CRC	var	

2.3.3 SI (Service Information) Object

	Value (HEX)		Description
1	3		<service information>
2	FE		extended_element_length (2-byte) indicator
3	var		tag length
4		81	<creationTime>
5		var	tag length
6		var	Date and Time
7		82	<originator>
8		11	tag length
9		"RedwoodComm"	

10		83				<serviceProvider>
11		11				tag length
12		"RedwoodComm"				
13		6				<defaultLanguage>
14		2				tag length
15		"en"				
16		26				<ensemble>
17		FE				extended_element_length (2-byte) indicator
18		var				tag length
19			80			<id>
20			3			tag length
21			ECC+EID			
22			10			<shortName>
23			9			tag length
24				1		<CDATA>
25				7		CDATA length
26				"Redwood"		
27			11			<mediumName>
28			0F			tag length
29				1		<CDATA>
30				0x0D		CDATA length
31				"Redwood Music"		
32			13			<mediaDescription>
33			18			tag length
34				1		<CDATA>
35				16		CDATA length
36				"Digital Radio Tester"		
37			28			<service>
38			var			tag length
39				29		<bearer>
40				8		tag length
41					80	<id>

42					6		tag length
43					40+ECC+Eld+SId		
44				10			<shortName>
45				5			tag length
46					1		<CDATA>
47					3		CDATA length
48					"SRV"		
49				11			<mediumName>
50				9			tag length
51					1		<CDATA>
52					7		CDATA length
53					"Service"		
54				13			<mediaDescription>
55				13			tag length
56					1A		<shortDescription>
57					11		tag length
58						1	<CDATA>
59						15	CDATA length
60						"Redwood Service"	
	* Items 39 to 43 are repeated as many times as the number of linked services.						

2.3.4 EPG Object

	Value (HEX)		Description
1	2		<epg>
2	FE		extended_element_length (2-byte) indicator
3	var		tag length
4		21	<schedule Element>

5		FE			extended_element_length (2-byte) indicator
6		var			tag length
7		81			<creationTime>
8		4			tag length
9		var			Date and Time
10		82			<originator>
11		11			tag length
12		"RedwoodComm"			
13		83			<serviceProviderr>
14		11			tag length
15		"RedwoodComm"			
16		24			<scope>
17		var			tag length
18			80		<startTime>
19			5		tag length
20			var		
21			81		<stopTime>
22			5		tag length
23			var		
24			25		<serviceScope>
25			8		tag length
26				80	<id>
27				6	tag length
28				0x40+ECC+EID+SID	
29		1C			<programme Element>
30		FE			extended_element_length (2-byte) indicator
31		var			tag length
32			81		<shortId>
33			3		tag length
34			GUI (EPG_ID)		
35			80		<id>

36			1C			tag length
37			"crid:thisisredwoodcomm.com%02d"			
38			82			<version>
39			2			tag length
40			1			
41			83			<recommendation>
42			1			tag length
43			2			Yes
44			10			<shortName>
45			6			tag length
46				1		<CDATA>
47				4		CDATA length
48				"P 00"		
49			11			<mediumName>
50			E			tag length
51				1		<CDATA>
52				C		CDATA length
53				"Programme 00"		
54			12			<longName>
55			16			tag length
56				1		<CDATA>
57				14		CDATA length
58				"Redwood Programme 00"		
59			19			<location>
60			var			tag length
61				2C		<time>
62				11		tag length
63					80	<time>
64					5	tag length
65					GUI	
66					81	<duration>
67					2	tag length
68					GUI	

69				2D			<bearer>
70				8			tag length
71					80		<id>
72					6		tag length
73					40+ECC+EID+SID		
74			13				<mediaDescription>
75			37				tag length
76				1A			<shortDescription>
77				1A			tag length
78					1		<CDATA>
79					18		CDATA length
80					"Redwood shortDescription"		
81				1B			<shortDescription>
82				19			tag length
83					1		<CDATA>
84					17		CDATA length
85					"Redwood longDescription"		
	* Items 24 to 28 are repeated as many times as the number of linked services						
	* Items 29 to 85 are repeated as many times as EPG_NUM.						

3. SPI - Service and Programme Information

The RWC2010C provides the function to test SPI using the PAD or Packet Data channel. The program logo files are fixed as the RedwoodComm logo files. So users do not need to download logo files. Some example PNG files can be downloaded from RedwoodComm's file server using the PC

3.1 SPI Test Using Data Channel

The SPI packet data channel can be configured as a secondary component of the existing DAB service as below.

SERVICE_00

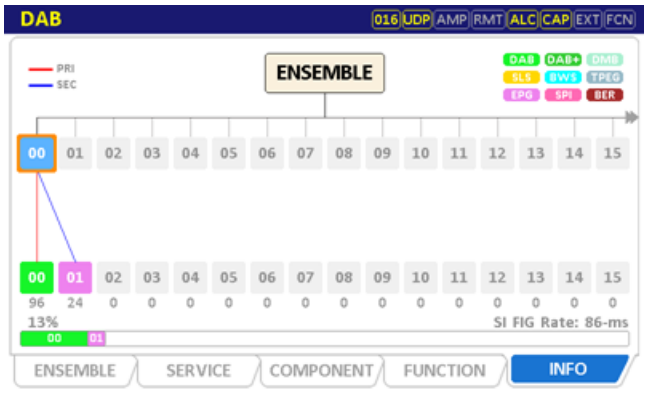
PRIMARY	COMPONENT_00
SECONDARY_1	COMPONENT_01

COMPONENT_00

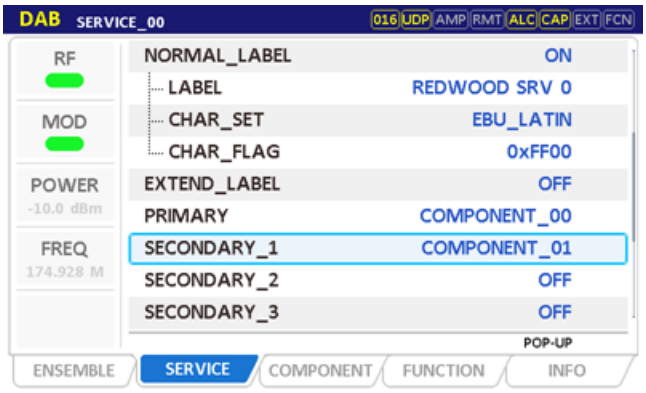
MODE	DAB
— CONTENTS	any mp2 file

COMPONENT_01

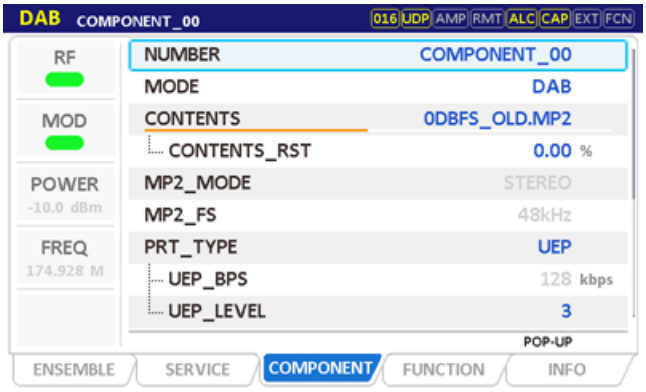
MODE	SPI
— CONTENTS	(none, internally allocated)
EEP_BPS	32 KBPS



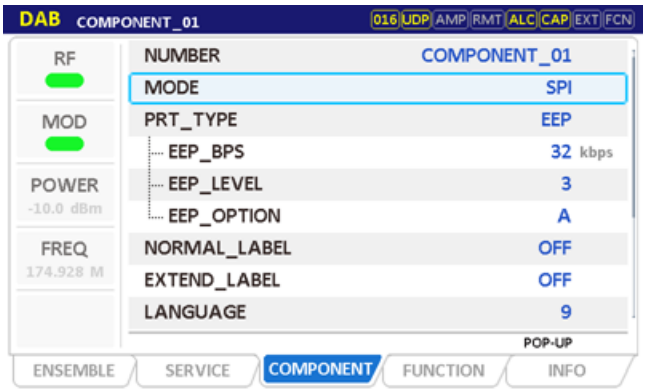
[Ensemble Structure]



[Service 00]



[Component 00 - DAB]



[Component 01 - SPI]

3.2 SPI Test Using PAD

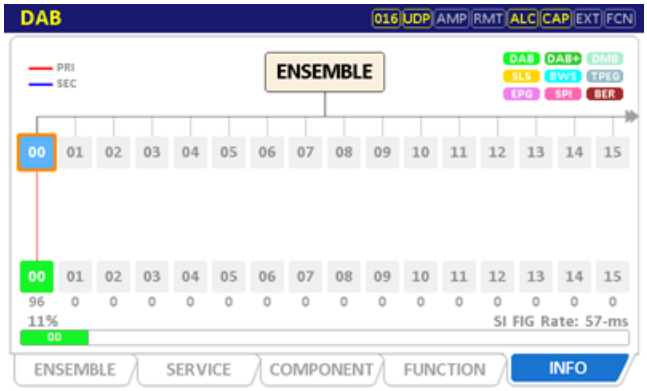
The SPI using the PAD channel can be configured in the primary component as below.

SERVICE_00

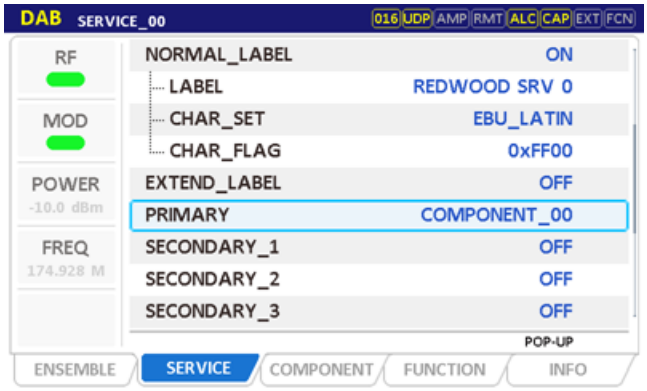
PRIMARY	COMPONENT_00

COMPONENT_00

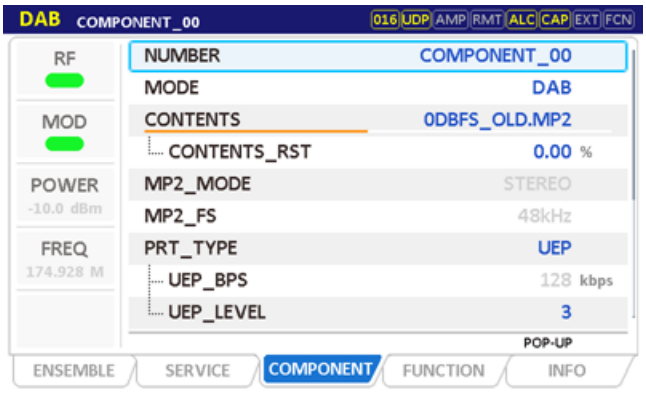
MODE	DAB
— CONTENTS	any mp2 file
PAD_TYPE	SPI
— CONTENTS	(none; internally allocated)



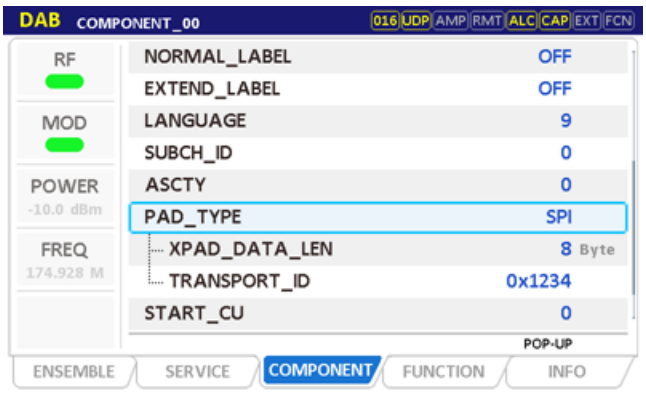
[Ensemble Structure]



[Service 00]



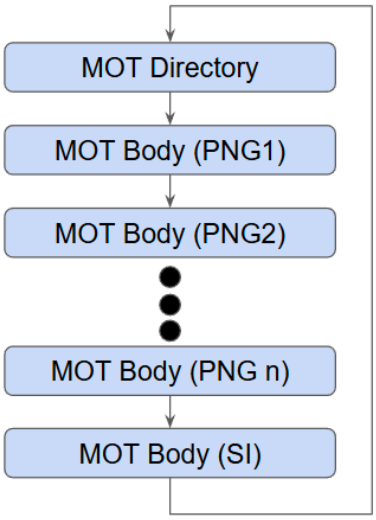
[Component 00 - DAB]



[Component 00 PAD - SPI]

3.3 Example of SPI MOT Data

It shows the structure and example values of the MOT Directory, MOT Body and SI objects transmitted through the SPI Data Service channel. MOT Body is used to transmit SI objects or PNG files.



3.3.1 MOT Directory

group	parameter	value	Description
DG Header	Extension flag	0	no extension
	CRC flag	1	data group CRC present
	Segment flag	1	
	User access flag	1	
	DG_type	6	MOT directory
Session Header	Last	1	
	Segment number	0	
	Transport Id flag	1	
	Length indicator	2	
	Transport Id	GUI	
Segment Header	Repetition Count	0	
	SegmentSize	var	
MOT Directory	CompressionFlag	0	
	Directory size	var	
	Number of Objects	5	
	Carousel_period	0	
	SegmentSize	0	

	Directory Extension Length	3	
	PLI	0	Parameter 0
	ParamId	0	SortedHeaderInformation
	PLI	1	Parameter 1
	ParamId	1	DefaultPermitOutdatedVersions
	DataField	1	
Object 0 (PNG)	Transport Id	GUI	
	Obj_BodySize		
	HeaderSize	35	
	ContentType	2	image
	ContentSubType	3	PNG
	PLI	3	Parameter 0
	ParamId	12	ContentName
	DataField	"spi_032x032.png"	
	PLI	2	Parameter 1
	ParamId	13	UniqueBodyVersion
	DataField	0x12345678	
Object 1 (PNG)	Transport Id	GUI	
	Obj_BodySize		
	HeaderSize	35	
	ContentType	2	image
	ContentSubType	3	PNG
	PLI	3	Parameter 0
	ParamId	12	ContentName
	DataField	"spi_112x032.png"	
	PLI	2	Parameter 1
	ParamId	13	UniqueBodyVersion
	DataField	0x12345678	
Object 2 (PNG)	Transport Id	GUI	
	Obj_BodySize		
	HeaderSize	35	
	ContentType	2	image

	ContentSubType	3	PNG
	PLI	3	Parameter 0
	ParamId	12	ContentName
	DataField	"spi_128x128.png"	
	PLI	2	Parameter 1
	ParamId	13	UniqueBodyVersion
	DataField	0x12345678	
Object 3 (PNG)	Transport Id	GUI	
	Obj_BodySize		
	HeaderSize	35	
	ContentType	2	image
	ContentSubType	3	PNG
	PLI	3	Parameter 0
	ParamId	12	ContentName
	DataField	"spi_320x240.png"	
	PLI	2	Parameter 1
	ParamId	13	UniqueBodyVersion
	DataField	0x12345678	
Object 4 (SI)	Transport Id	GUI	
	Obj_BodySize		
	HeaderSize	36	
	ContentType	7	SPI System
	ContentSubType	0	Object contains Service Information
	PLI	3	Parameter 0
	ParamId	12	ContentName
	DataField	"logo_redwood.EIB"	
	PLI	2	Parameter 1
	ParamId	13	UniqueBodyVersion
	DataField	0x12345600	
	PLI	3	Parameter 2
	ParamId	27	SPI ScopeID
	DataField	ECC+EID	
	CRC		

3.3.2 MOT Body

group	parameter	value	Description
DG Header	Extension flag	0	no extension
	CRC flag	1	data group CRC present
	Segment flag	1	
	User access flag	1	
	DG_type	4	MOT body
Session Header	Last	var	
	Segment number	var	
	Transport Id flag	1	
	Length indicator	2	
	Transport Id	GUI	
Segment Header	Repetition Count	0	
	SegmentSize	var	
PNG file or SI	Segment of PNG file or SI		
CRC	CRC	var	

3.3.3 SI (Service Information) Object

	Value (HEX)		Description
1	3		<service information>
2	FE		extended_element_length (2-byte) indicator
3	var		tag length
4		81	<creationTime>
5		var	tag length

6		var			Date and Time
7		82			<originator>
8		11			tag length
9		"RedwoodComm"			
10		6			<defaultLanguage>
11		2			tag length
12		"en"			
13		26			<ensemble>
14		FE			extended_element_length (2-byte) indicator
15		var			tag length
16			80		<id>
17			3		tag length
18			ECC+EID		
19			10		<shortName>
20			9		tag length
21				1	<CDATA>
22				7	CDATA length
23				"Redwood"	
24			11		<mediumName>
25			0F		tag length
26				1	<CDATA>
27				0x0D	CDATA length
28				"Redwood Music"	
29			13		<mediaDescription>
30			18		tag length
31				1	<CDATA>
32				16	CDATA length
33				"Digital Radio Tester"	
34			28		<service>
35			var		tag length
36				29	<bearer>
37				8	tag length

38					80			<id>
39					6			tag length
40					40+ECC+EId+SId			
41				10				<shortName>
42				5				tag length
43					1			<CDATA>
44					3			CDATA length
45					"SRV"			
46				11				<mediumName>
47				9				tag length
48					1			<CDATA>
49					7			CDATA length
50					"Service"			
51				13				<mediaDescription>
52				13				tag length
53					1A			<shortDescription>
54					11			tag length
55						1		<CDATA>
56						15		CDATA length
57						"Redwood Service"		
58				13				<mediaDescription>
59				var				tag length
60					2B			<multimedia>
61					var			tag length
62						82		<url>
63						var		tag length
64						"spi_032x032.png"		
65						83		<type>
66						1		tag length
67						4		logo_colour_square
68				13				<mediaDescription>
69				var				tag length
70					2B			<multimedia>

71					var			tag length
72						82		<url>
73						var		tag length
74						"spi_112x032.png"		
75						83		<type>
76						1		tag length
77						6		logo_colour_rectangle
78				13				<mediaDescription>
79				var				tag length
80					2B			<multimedia>
81					var			tag length
82						80		<mimeValue>
83						9		tag length
84						"image/png"		
85						82		<url>
86						var		tag length
87						"spi_128x128.png"		
88						83		<type>
89						1		tag length
90						2		logo_unrestricted
91						84		<width>
92						2		tag length
93						80		128
94						85		<height>
95						2		tag length
96						80		128
97				13				<mediaDescription>
98				var				tag length
99					2B			<multimedia>
100					var			tag length
101						80		<mimeValue>
102						9		tag length
103						"image/png"		

104						82	<url>
105						var	tag length
106						"spi_320x240.png"	
107						83	<type>
108						1	tag length
109						2	logo_unrestricted
110						84	<width>
111						2	tag length
112						140	320
113						85	<height>
114						2	tag length
115						F0	240
	* Items 36 to 40 are repeated as many times as the number of linked services.						

4. DLS - Dynamic Label Service

The RWC2010C provides the function to test DLS/DL+ using the PAD channel. DLS strings can be edited in the GUI of RWC2010C. As described in 4.2, we recommend using the RWC2010_utility.exe program for DLS editing. This allows you to edit non-Latin text easily. You can also edit non-Latin characters in RWC2010C using the HEX Editing mode. Switching between ASCII mode and HEX mode is done using the UNIT key.

4.1 DLS/DL+ Test Using PAD

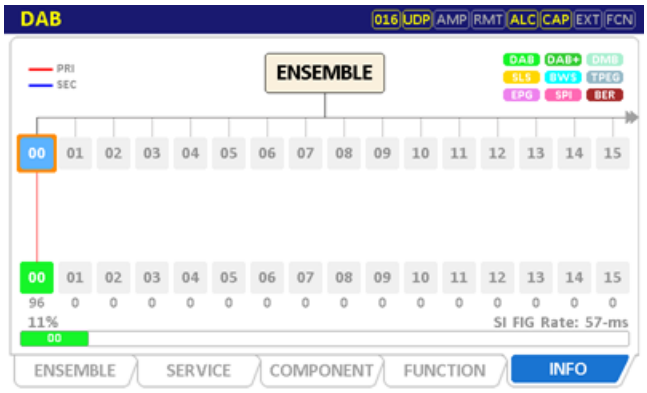
The DLS/DL+ PAD channel can be configured in the primary component as below.

SERVICE_00

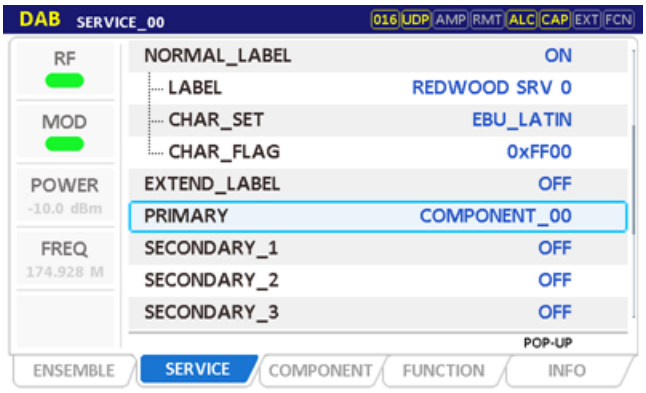
PRIMARY	COMPONENT_00

COMPONENT_00

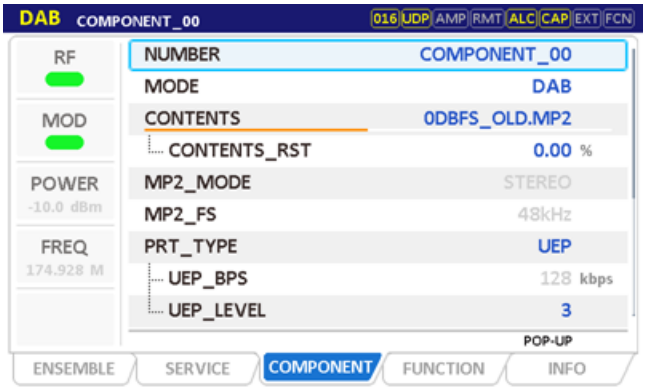
MODE	DAB
— CONTENTS	any mp2 file
PAD_TYPE	DLS
— DLS	Editable



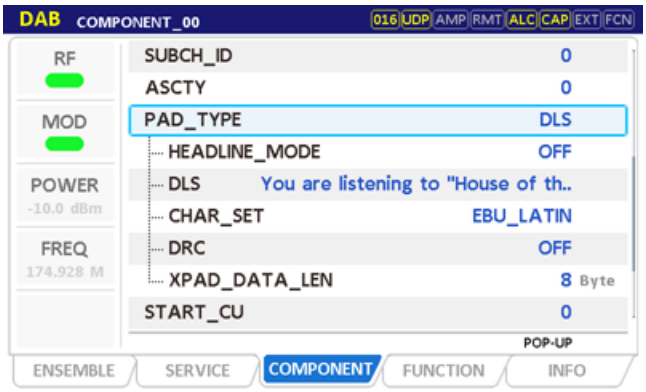
[Ensemble Structure]



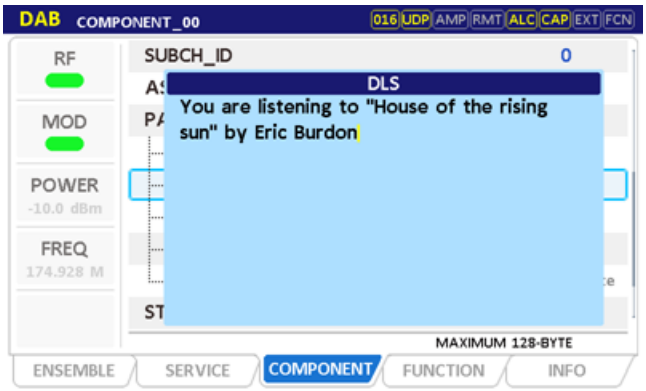
[Service 00]



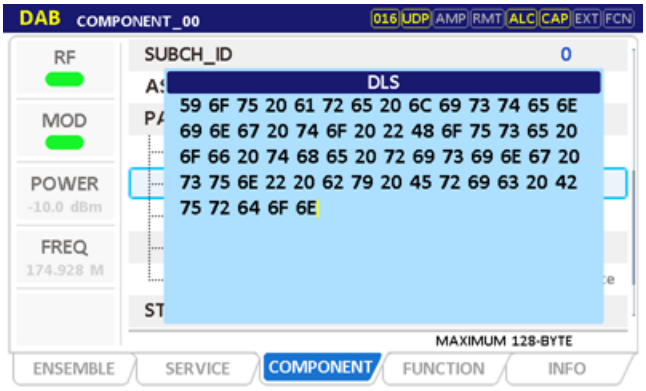
[Component 00 - DAB]



[Component 00 PAD - DLS]



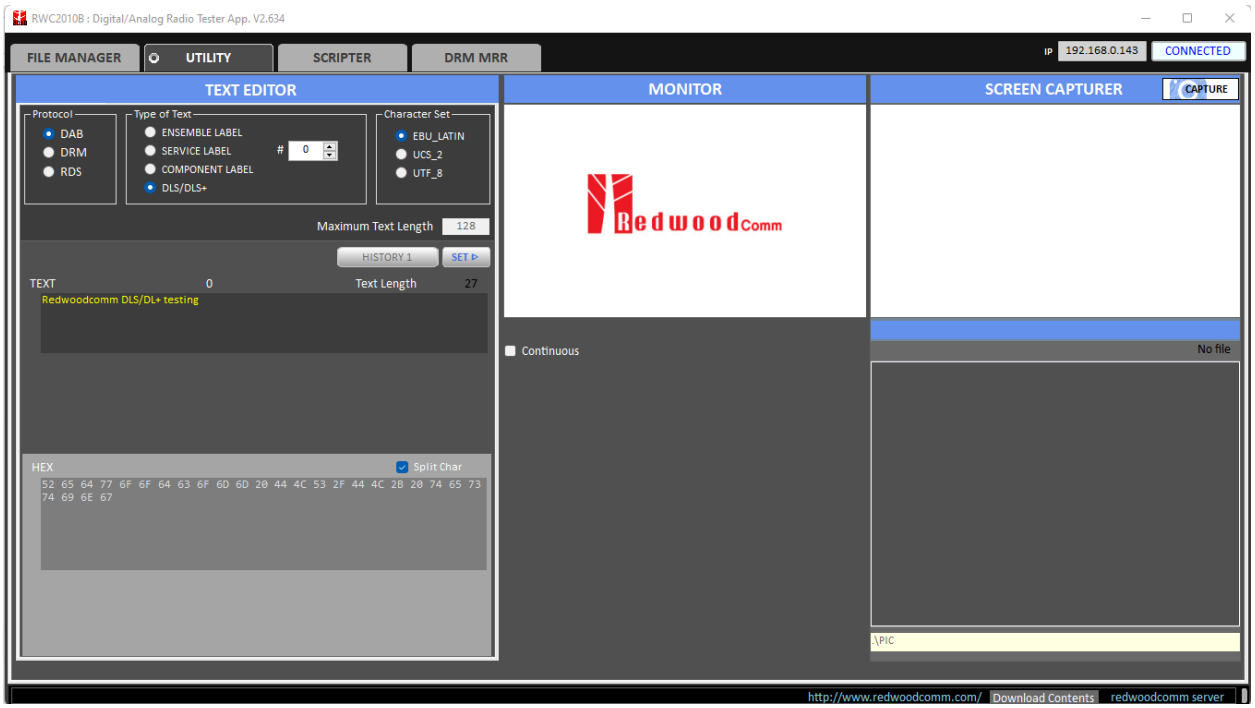
[DLS Editor in ASCII mode]



[DLS Editor in HEX mode]

4.2 DLS Editing Using PC program

RedwoodComm provides an easy way to edit multiple languages using a PC program as below. After installing the language pack of the desired language on your PC, edit it in the RWC2010x APP program, and the PC APP program will automatically convert it to HEX. After completing editing, click the SET button in the PC APP program, and the converted HEX value will be automatically set to RWC2010C.


RWC2010B : Digital/Analog Radio Tester App. V2.634
FILE MANAGER
UTILITY
SCRIPTER
DRM MRR
IP
192.168.0.143
CONNECTED
TEXT EDITOR
MONITOR
SCREEN CAPTURER
CAPTURE
Protocol
DAB
DRM
RDS
Type of Text
ENSEMBLE LABEL
SERVICE LABEL
COMPONENT LABEL
DLS/DLS+
#
0
Character Set
EBU_LATIN
UCS_2
UTF_8
Maximum Text Length
128
HISTORY 1
SET
TEXT
0
Text Length
27
Redwoodcomm DLS/DL+ testing
HEX
Split Char
52 65 64 77 6F 6F 64 63 6F 6D 6D 20 44 4C 53 2F 44 4C 2B 20 74 65 73
74 69 6E 67
Continuous
No file
.\PIC
http://www.redwoodcomm.com/
Download Contents
redwoodcomm server